MYSORE GOVERNMENT SECRETARIAT
3283
28 JUN 1957.
ELECTRICAL BRANCH

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1954-50 File No. 6730/36

VIII

B CLASS P.W. DEPARTMENT

El. BRANCH

Subject:— Grid System of Electricity

BK 1954

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File No. 6730/36-VIII

Ed. Secrt. Slip. 24 A

G.R., G.D., No. 2408, dated 22-6-22.]

Correspondence

DOCKET SHEET

Subject :—

File No. 6730/36-VIII

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References :—

Date.	To whom sent.	Notes and instructions.

BOMBAY ELECTRIC GRID.

Pursuant to the declared policy of Government to promote rapid development of the use of electricity in small towns and villages, the Electric Grid Department has undertaken the execution of the following schemes.

North Gujarat Grid.

Electric power for North Gujarat Grid is proposed to be purchased from the Ahmedabad Electricity Co.'s power station which is being extended to a total capacity of 97500 KW to meet the growing demand of electricity in the Co.'s area of supply as well as the Grid requirements.

Power will be transmitted to Baroda in the South at 66 KV and to Kalol in the North at 33 KV. The construction of the 66 KV lines from Ahmedabad to Baroda is nearing completion. The main receiving stations are being located at Ahmedabad, Barejadi, Nadiad, Anand Baroda and Kalol. An extensive 11 KV system from the 1st four of these stations will be put up to cover territory of a total of about 2400 square miles. Applications for supply to about 700 irrigation pumps have already been received. Electricity will also be made available in rural areas for domestic lighting and small scale industries. Supply of electricity in this area is scheduled to commence in the 1st half of 1950.

South Gujarat Grid.

The site at Utran near Surat has been selected for establishing a steam power station comprising initially of two7500 KW turbo sets. A 66 KV line from Surat to Billimora will be run with main receiving stations at Surat, Navsari and Billimora. Supply to Bulsar will be by a D/C 11 KV line from Billimora. The area withing economic reach of projected lines is about 900 sq. miles It is intended to serve about 350 irrigation pumps within the 1st 5 years.

According to present indications the supply of electricity in this region is expected to commence by the end of 1950.

Nursery.....

Nursery Schemes:

Isolated small towns that cannot be served from major grid schemes are proposed to be supplied with electricity by establishing small diesel stations. Government had sanctioned detailed investigation and preparation of schemes for 25 towns. Accordingly schemes sanctioned for 4 towns of Ratnagiri, Malwan, Chiplun and Vengurla are under execution and supply of electricity in this area is expected to commence by the middle of 1949.

Schemes for the 9 towns in Satara and Bijapur District, 2 in East Khandesh and 6 in Belgaum Dist. recently sanctioned by Government will now be undertaken for execution. Schemes for remaining towns are under investigation and preparation.

Koyna Hydro Electric Project:

The full development of the scheme will involve the construction of a dam about 300 feet high across the Koyna river to impound about 156,000 million cubic feet of water. Of this quantity 44,000 million cubic feet for may be used for lift irrigation and 69,000 million cubic feet for power development of about 280,000 KW. If lift irrigation is decided upon the approximate power demand for that purpose in the first phase is estimated to be 82,000 KW bringing some 440,000 acres of land in the Bijapur district under irrigation. The balance of the Power will be available for electrochemical of the power house and textile, engineering and other industries within a reasonable distance of the power house and textile, engineering and other industries in certain parts of Satara, Bijapur, Sholapur, Poona and Thana Districts. The transmission system would include 132,000 volt lines of nearly 280 miles to Almati and Sholapur and about 160 miles to Kalyan and distribution lines at 33, 22 and 11 KV. Detailed survey and exploratory work for the Dam, tunnel, pipe line, Power-House and transmission lines has been in progress for some time & is expected to be completed shortly. It has just needed a stage when work on final designs can be undertaken.

Kalinadi.....

Kalinadi Hydro Electric Project:

The work connected with the preliminary survey for the project was entrusted to Messrs. Associated Consulting Engineers (Bombay). Their interim report indicates that 350,000 KW of continuous power could be made available in the Kalinadi basin developed in 5 power houses to be spread over this area. Final report is expected to be received very shortly .

This source of power when developed in the future would be able to serve the districts of Dharwar, Kanara and Belgaum.

Utilisation of Jog Power:

Negotiations are in progress with the Government of Mysore for the supply of 1000 KW to be later increased to 30000 KW in bulk to the Bombay Government from their hydro electric station at Jog. The Jog power will be transmitted by E.H.T. lines to the districts of Dharwar, Kanara and Belgaum.

SBS.

Original papers
in E.B.(I) File
No. 1326/48.

Copy of this broad cast talk of D.S. in Marathi on 10-2-50.

Rural Electrification

The electrical energy can be used in a wide variety of ways, which cannot be conceived of, with any other type of energy. It can be used to the service of mankind in multifarious ways, increasing his earning capacity, standard of living and comfort. In a highly industrialised very closely with the day to day or even hour to hour activities of the average man. In his home, it burns lights, pumps water, moves fans, works call bells and operates refrigeration and cooking appliances. On his way either to his office or the factory he is transported by the Suburban Trains driven on electrical energy. The machines in his front at the factory are also operated by the same energy. The man going to the office is served by this energy in the form of lifts and/or air conditioning apparatus. Thus practically every body residing on large cities is quite conversant with the wonderful use to which this type of energy can be put to. No description is needed to show as to what great inconveniences is caused in the absence of electricity even for a short time at such places because those who were present in Bombay at the time of the cyclone of November 1948, can very well imagine the state of the city without electricity.

2. But 90 per cent of our people live in vester rural areas, as against 50 per cent or less in western or other highly industrialized countries. Thus the portion of the population in India which derives this benefit of electricity power is very small indeed, since the vast population in the rural areas is without it. Growing tendencies towards achieving a better standard of living and the health and well being of our rural people have emphasised the need for taking some positive steps in the matter of rural development activities. We see throughout the world greater effort being made to narrow the big gap that exists between the urban and rural life, to increase the purchasing power of the people and to make their life more attractive and not a

a burden. This problem has got several aspects and it is outside the scope of my talk to examine how far attention has been given to all these aspects. Electrification has to be given the pride of place in any scheme of Rural Development and I shall confine my remarks to this alone.

3. Let us pose one or two questions before we go deeper into the subject. (i) Is there any demand from the people themselves? (ii) Is electricity for ordinary domestic purposes a luxury? and (iii) What is the relative importance and urgency of ~~&~~ electrification in rural areas vis-a-vis other rural development activities such as roads, water supply, education, medical aid, post offices, etc.?

4. Since the war there has been a great demand for electricity from the rural parts too. People have realised that the kerosene oil for lighting is not a dependable commodity and vegetable oils fetch them better prices. Electricity is thus no longer in a stage of being considered a luxury even for domestic purposes. This applies not only in urban but in rural areas too. It has been the experience that the demand for electricity from the people is always on the demand for electricity from the people is always on the increase and hence the demand, in the future, for electric power will be very large. In the interest of the people living in urban areas themselves, the electrification of rural areas is an all important necessity, because apart from all social values, it will ensure certain conveniences in the matter of production of food and cash crops as raw materials for our growing industries, enable development of some small scale and cottage industries and thereby bring the present backward condition of India with 80% of the people dependent on agriculture and 20% only on industries to the generallu accepted level of 60% on agriculture and 40% on industry. To the next question i.e. as to what is the relative importance and urgency of rural electrification the answer would be that the provision of electric supply

supply is not only one of the several rural problems but also the most important one. It is the key to the entire rural development because it places in the hands of every individual scope for building his economy and for raising his income.

5. Besides lighting, the main demand for electric power in the rural area would be for lift irrigation. As is known widely only a small percentage of area in this Province is actually under irrigation. A fairly large number of major and minor irrigation schemes have been undertaken by Government to increase the irrigated area. But in spite of this, there will be large areas which cannot be commanded by canals. Such areas can be irrigated, provided there is water either in river or nalla streams or wells, by pumping only. For this purpose there is nothing to equal electric moter. A large potential load for power thus exists in the rural area for irrigation purposes. Then we have got the common village industry of weaving. It has been the experience at places like Malegaon (District Nasik) and Surat where a large number of hand looms have been converted to operate as power looms, the production of the weaver has increased 3 to 4 times. Amongst other small scale and village industries may also be mentioned rice hulling mill, flour mill, saw factory, cotton ginning, oil crushing, and decorticating nuts. Tinning of fruits and vegetables can also be conveniently introduced and so also dairy farming.

6. But the main obstacle in achieving the widespread use of electricity to rural areas is the cost. Since it is very costly to take power to villages although it can be somewhat lowered down by (i) production of very cheap power by harnessing water resources in the country, (ii) economising the cost in transmission by using local materials such as wooden poles and (iii) standardisation in designs. If low tariffs are insisted on there is not profit in rural electrification. If they are high, the use of electricity will not be widespread. In any case there is no doubt that

rural.....

rural electrification will never attract investment from private enterprise having profit motive. For this reason, we experience that the private licensees make little or no progress in spreading the use of electricity in the villages. These schemes however should not be examined only from the view point of financial surplus or deficit. It should be considered as a definite part of the plan to increase industrial and agricultural production, treating the deficit until such time the scheme becomes self-supporting, as a justifiable nation building expenditure. Since only Government can view the problem in this way, the whole responsibility of carrying electricity to villages has naturally fallen on Govt.

7. Let us therefore survey the position of electricity supply in Bombay Province and the steps taken by Government in respect of extending the electrification schemes with particular reference to the rural areas.

8. The total installed capacity at present in Bombay Province is nearly 4,00,000 KW. Out of this about 80% energy is used in big cities like Bombay, Ahmedabad, Sholapur and Poona and the rest is utilised in other towns. Only a fraction of the rural area is electrified.

Comparison of the consumption of electricity in Bombay Province with that of advanced countries like England, U.S.A. is of significance and illustrative of the large magnitude of work yet to be done to come nearer to the standard obtained in those countries.

Bombay Province	65	Kwh / generation/head/annum.
Norway	2624	-do-
Canada	3375	-do-
The U.S.A.	1583	-do-
The U.K.	877	-do-

9. The Govt. of Bombay has therefore established in 1944-45 the Electric Grid Deptt. with the following objects:-

(1).....

(1) To nationalise the generation of electricity by generating it at a few selected stations having natural advantages.

(2) To make available progressively large amounts of electricity at low rates.

(3) To bring the energy within reach of progressively increasing number of urban and rural population.

10 A number of electrification schemes both for urban and rural areas have been undertaken as part of the first five-year programme of post war reconstruction as described below.

(i) North Gujarat Electric Grid Scheme:- Power for this scheme is proposed to be purchased in bulk from the Ahmedabad Electric Supply Co. and distributed over an area covering about 2400 square miles lying between Ahmedabad and Baroda. Apart from supplying electricity to towns situated in this area, the scheme is expected to supply energy to about 700 to 800 irrigation pumps in this area and also to small scale and village industries. Estimated cost is Rs. 223 lakhs; work is in progress and stage I of the same is expected to be ready by the end of 1950.

(ii) South Gujarat Electric Grid Scheme:- A new power house of the immediate installed capacity of 15000 KW is being erected at Utran near Surat. The area within the economic reach of this scheme is 900 square miles. In this case also power would be supplied to about 350 irrigation pumps (each of 5 to 10 B.H.P.) within first 5 years of the working and small scale and village industries. The estimated cost is Rs. 302 lakhs. The work is in progress. Stage I i.e. supply of power to Surat is espected to be completed by the end of 1950.

(iii) Diesel Nursery Schemes in Ratnagiri Dist:- Four towns in Ratnagiri District viz. Chiplun, Ratnagiri, Malwan and Vengurla will be electrified at the cost of Rs. 17 lakhs. The power house at Vengurla has been switched on and three others will also be ready soon.

(iv) Electrification of 10 villages in Bulsar Taluka:- 10 villages in Bulsar Taluka are being electrified after obtaining power from Bulsar Electricity ~~after obtaining power~~ Supply

Supply Co. Estimated cost is Rs. 5 lakhs. This is expected to be ready by the middle of 1950.

(v) Electrification of 21 villages in Satara Taluka:- 21 villages in Satara Taluka are proposed to be electrified at an estimated cost of Rs. 11 lakhs, obtaining power from the Satara Electricity Supply Co. This work is expected to be ready by the middle of 1950.

(vi) Diesel nursery scheme for Islampur and Peth:- The scheme will electrify Peth and Islampur towns of Satara Dist. Estimated cost Rs. 4.6 lakhs. The work which is in progress is expected to be completed by the middle of 1950.

(vii) Diesel nursery schemes for Guledgud Kamatgi and for Hungund, Ilkal, Sulebhavi, Gudur and Amingad:- These small towns in Bijapur Dist. will be electrified at an estimated cost of Rs. 12.8 lakhs. The schemes are expected to be ready early in 1952.

(viii) Nursery scheme at Dharangaon, Erandol and Parole in the East Khandesh Dist:- The scheme which would cost Rs. 11.5 lakhs is expected to be ready in March 1952.

(ix) Diesel nursery schemes for the towns of Hukeri, Chikodi, Sankeshvar, Gokak Konnur and for Bailhongal in Belgaum Dist:- Estimated cost Rs. 17.6 lakhs. They will be ready by the end of 1952.

Besides, nursery schemes for the following towns have also been prepared:-

Dhanduka, Dholka in Ahmedabad Dist.	estimated cost	Rs.11.3 lakhs
Shendurni in East Khandesh Dist.	"	Rs. 9.2 "
Shahada in West Khandesh Dist.	"	Rs. 6.4 "
Akluj in Sholapur Dist.	"	Rs. 5.6 "
Gajendragad in Dharwar Dist.	"	Rs. 3.4 "

A few words about the principles followed in establishing isolated diesel sets will not be out of place. Rural areas which are within the economic reach of the various transmission and distribution lines will be supplied electricity from the main power schemes. For small isolated towns and villages which cannot be served economically from the Grid lines, it is now proposed to establish Diesel stations. The criteria fixed

fixed by Government for selecting towns for electrification in the first 5-year programme are (i) the total number of houses in the town should be about 2000 or more and (ii) there should exist cottage industries like hand weaving, oil pressing etc. of reasonable magnitude and/or where electrically operated irrigation pumps can be installed.

(x) Jog-Karnatak Electricity Scheme:- The Mysore Government has agreed to supply from Mahatma Gandhi Power House, 10,000 KW at Jog and 1,500 KW at Harihar. This power is proposed to be distributed in the large and small towns of Sirsi, Dandeli, Hubli, Gadag, Ranebennur, Byadgi, Haveri, Tumminhatti, Chikkurwatti and Guttal. Estimated cost Rs. 175 lakhs. Work is expected to be completed early in 1953.

(xi) Radhnagari Hydro-Electric-cum-irrigation scheme:- This scheme which has been launched by the former Kolhapur State is being now carried to completion. The object of the scheme is to generate 5000 KW of power downstream side of the dam and supply it to Kolhapur town and irrigation pumps and provide water for irrigation in the Panchganga valley. The total estimated cost of the scheme is Rs. 207 lakhs and it is likely to be completed by the end of 1952.

(xii) Emergency lift irrigation scheme on the Panchganga in Kolhapur Distt:- Power is generated to the extent of 750 KW in the Diesel station at Kolhapur and the same is supplied through transmission lines along the Panchganga River about 35 miles in length from Kolhapur to Shirol, to work 44 irrigation pumps (40 of one cusec capacity and 4 of 5 cusecs capacity each). The scheme which is estimated to cost about Rs. 11 lakhs is completed except for the installation of 7 pumping set sets. When power from Radhnagari Hydro-electric works will be available, area under lift irrigation would go up by increasing the number of pumps to about 200. This scheme is a very good illustration as to how with advantage, electric power can be put to use for irrigation purposes.

(xiii).....

(xiii) The following schemes prepared by the former Baroda State are also in progress:-

(a)	Extension of Grid power from Baroda to Padra, Petlad, Bhadran and Dharmaj.	est. cost Rs. 14.20 lakhs
(b)	Supplying Grid power to Kalol, Kadi, Vijapur and other towns.	est. cost Rs. 11.9 lakhs
(c)	Baroda conversion scheme.	est. cost Rs. 30 lakhs.

I will now mention the other electricity schemes under active consideration at present. The Koyna hydro-electric-cum-irrigation scheme both as regards its power part and the irrigation part is being very actively investigated. This scheme which as estimated at present would cost Rs. 45 crores, is expected ultimately to generate power of nearly 4,00,000 KW besides irrigating about 4 lakhs of acres of land on the banks of Krishna river, from Karad to Bijapur District border.

Government is also considering the installation of thermal power station of 45,000 KW capacity at Chola near Kalyan to meet the acute power supply position in the inter-connected Tata system.

The scheme of constructing a high dam across Tapi river at Kakrapar for generating about 2,16,000 KW energy at that site besides irrigation etc., is being further considered by Government.

Kalinadi in the North Kanara Dist. if harnessed has also a vast potential for the production of power since it is capable of generating 2,50,000 KW of power. This scheme is also being investigated further.

11. Apart from these schemes under investigation, work has been already or about or about to be started on a number of large and small electric schemes mentioned by me a short while ago costing about Rs. 10½ crores. The allocation for the electric Grid scheme, during the first 5-year programme is Rs. 675 lakhs. The Government of Bombay is thus quite alive to the importance and the urgency of the expansion of electricity power throughout the Province. It is true that

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the progress in executing them is considerably delayed and hampered by the factors like (1) Paucity of technical personnel, (2) shortage of steal, (3) transport difficulty and above all (4) long deliveries of power plant and equipment from a-broad. But in spite of these odds, every effort is being made to push on the schemes as ~~speedily~~ speedily as possible.

12. I have given an account of all the proposed schemes in Bombay Province, although some of them cannot be said to be only for the rural areas. But since the basic idea of Grid is to pool all the power and use it over a wide area to the best advantage of industrial cities, urban and rural areas, all of them have to be mentioned to get the correct idea of Government's efforts to extend the benefits of electrcity to the large rural areas.

13. The question of rural electrification will not be completely solved by only producing the power and making it available at a rate which the rural population can bear. In order to encourage agriculturists and those industry basis, to use electricity for such purposes as pumping of water, weaving of cloth, making of wood and metal articles, gridning of flour etc. it is necessary to provide on hire-purchase system such appliances as electric motors and switch-gear, electrical water pump sets, electrically operated looms, oil ghanis, lathes, flour and rice milling machinery and also arrange for the wiring up of the premises of the agriculturists and industrial workers and other prospective consumers of electrical energy. The terms under which this concession can be given under examination by Government at present.